MATH F113X: Kruskal's Algorithm

Goals:

- Understand the terms: tree, spanning tree, minimum cost spanning tree
- Understand how to use Kruskal's Algorithm to find a minimum cost spanning tree
- Know of applications of minimum cost spanning trees

1. Recap: the **Handshake Lemma**

2. Definitions

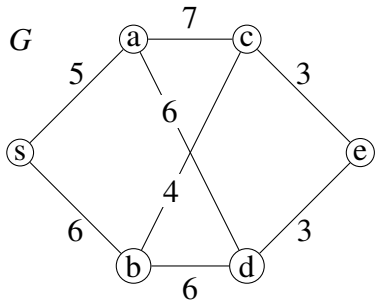
   (a) **weighted graph**

   (b) **tree**

   (c) **spanning tree**

   (d) **minimum cost spanning tree**

3. Example:



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4. Kruskal's Algorithm

   input: a graph, G, with costs (or weights) on the edges
   output: a spanning tree, T, of minimum cost
   Steps:

   (a) (Initialization Step:) T is a graph on the vertex set of G but with no edges.

   (b) (Iterative Step:)

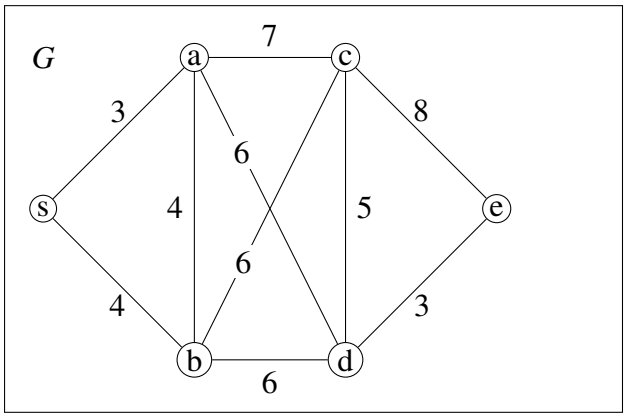
   i. Select the cheapest unused edge in the graph. (Ties are broken alphabetically.)

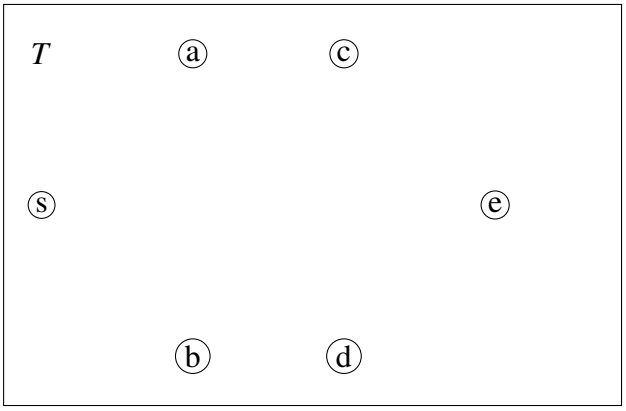
   ii. If the edge does **not** create a cycle, add the edge to T. Otherwise, reject the edge.

   iii. Mark the edge as used.

   iv. If T is a spanning tree, STOP. Otherwise return to the beginning of the iterative step.

5. Use Kruskal's Algorithm to find the minimum cost spanning tree for the graph G below.





Used?	edges	weights

6. Think of an application of Kruskal's Algorithm.